

## **SCREENABLE MOISTURE-PASSIVATED PLANAR INDEX-GUIDED VCSEL**

### **ABSTRACT**

Screenable vertical cavity surface emitting lasers (VCSELs) and methods of  
5 manufacturing the same are described. These systems and methods address the  
unique susceptibility of these devices to damage that otherwise might be caused  
by moisture intrusion into the etch holes that are used to form the index-guiding  
confinement regions. In one aspect, a VCSEL includes a vertical stack structure  
having a top surface. The vertical stack structure includes a top mirror, a bottom  
10 mirror, and a cavity region that is disposed between the top mirror and the  
bottom mirror and includes an active light generation region. At least one of the  
top mirror and the bottom mirror has at least one layer defining an aperture  
region. The vertical stack structure defines at least one sidewall area extending  
from the top surface to at least a depth corresponding to the aperture region. The  
15 VCSEL further includes a defect indicator system that is disposed in a screening  
region at the sidewall area. The defect indicator system includes an indicator  
layer with a chemically alterable optical property, and a barrier layer overlying  
the indicator layer.